Deep UV Blocking Particle Filter, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

For sensitive detection of neutral and charged particles in satellite survey missions, instrumentation for the efficient rejection of EUV, Deep UV and visible flux is needed that also efficiently transmits the particles. At present, commercially available filters offer deep UV rejection, limited particle transmission efficiency, and limited lateral dimensions. The team of MicroXact Inc., Virginia Tech and Old Dominion University (ODU) is proposing to develop a deep UV blocking particle filter for NASA and commercial applications that will combine superior mechanical stability, with efficient UV blocking and high particle transmission efficiency. The proposed filter is based on macroporous silicon with conformal pore wall coating by Atomic Layer Deposition. In Phase I of the project the team will finalize the design of the MPSi structure, will make two iterations in fabrication of the filter prototype and will perform testing of both UV rejection and particle transmission to fully validate the proposed approach. In Phase II the team will optimize the material fabrication, and design and fabricate a packaged UV blocking particle filter that will fully comply with NASA specifications and will perform testing in a relevant environment. The filters developed on this SBIR project will be commercialized in Phase III.

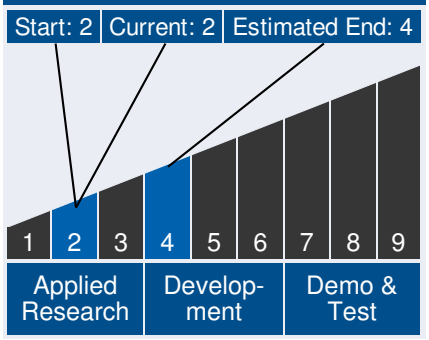
ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: Satellite survey missions (IMAP, MEDICI, DRIVE Initiative, EXPLORERs, DISCOVERY, CubeSats / Smallsats, etc.) require filtering the incident radiation to plasma and neutral particle sensors for applications such as space weather monitoring and forecasting, exploration of planetary environments and interstellar medium, etc. For sensitive detection of neutral and charged particles in satellite survey missions, an instrumentation for efficient rejection of EUV, Deep UV and visible flux is needed that also

Table of Contents

Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

Continued on following page.

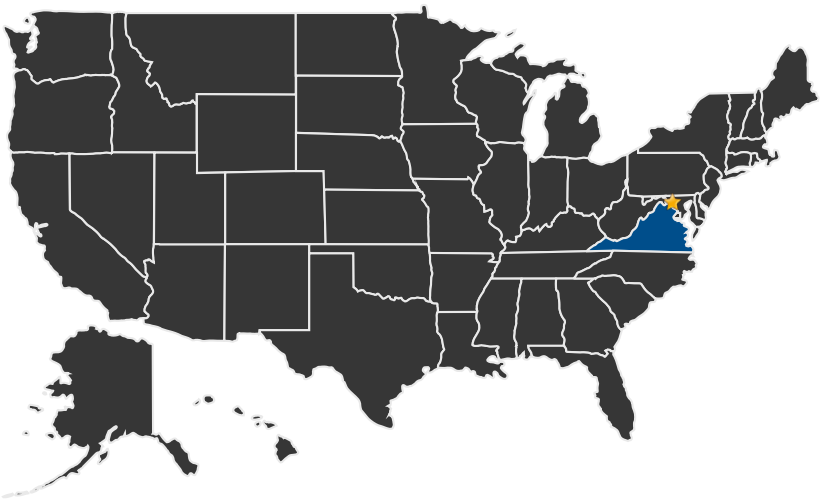
Deep UV Blocking Particle Filter, Phase I Project

efficiently transmits the particles. The proposed concept, when developed and commercialized, is expected to have a significant and immediate impact on such NASA missions.

To the commercial space industry:

Potential Non-NASA Commercial Applications: Similar designs of these filters are expected to find considerable DoD applications in secure UV communication, an area being actively developed by a number of DoD agencies. Equally important are multiple DoE applications of the proposed technology spanning from plasma parameter monitoring in tokamaks, particle detection in accelerators, lightning and aurora studies, etc. Commercial applications include plasma monitoring in plasma etching systems, reactive ion etching systems and multiple other monitoring and control applications of tools using plasma (spanning from semiconductor processing to the medical field to general material science).

U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Goddard Space Flight Center

Management Team *(cont.)*

Principal Investigator:
- Vladimir Kochergin

Technology Areas

Primary Technology Area:
Science Instruments, Observatories, and Sensor Systems (TA 8)
- Remote Sensing Instruments and Sensors (TA 8.1)
  - Detectors and Focal Planes (TA 8.1.1)

Deep UV Blocking Particle Filter, Phase I Project

Other Organizations Performing Work:

- MicroXact, Inc. (Blacksburg, VA)

PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23111)

IMAGE GALLERY

Deep UV Blocking Particle Filter, Phase I

DETAILS FOR TECHNOLOGY 1

Technology Title

Deep UV Blocking Particle Filter, Phase I

Potential Applications

Satellite survey missions (IMAP, MEDICI, DRIVE Initiative, EXPLORERs, DISCOVERY, CubeSats / Smallsats, etc.) require filtering the incident radiation to plasma and neutral particle sensors for applications such as space weather monitoring and forecasting, exploration of planetary environments and interstellar medium, etc. For sensitive detection of neutral and charged particles in satellite survey missions, an instrumentation for efficient rejection of EUV, Deep UV and visible flux is needed that also efficiently transmits the particles. The proposed concept, when developed and commercialized, is expected to have a significant and immediate impact on such NASA missions.